An Analysis of Intermediate Timber Harvest Based on Operational Methods at Manchester State Forest

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Background

The South Carolina Forestry Commission (SCFC) was established by law in April 1927. The agency's original mission was to protect forest land, to promote the benefits of forest management, and to monitor the forests' condition. The mission of the SCFC has not changed much over the years, as the current mission is to protect, promote, and nurture the forest lands of South Carolina in a manner consistent with achieving the greatest good for its citizens.

The SCFC owns, operates, and manages five state forests: Sand Hills State Forest, Manchester State Forest, Harbison State Forest, Poe Creek State Forest, and Wee Tee State Forest. These five state forests provide a wide variety of benefits for the citizens of South Carolina. The state forest division of the SCFC is 100% self-sufficient. We receive $0.00 allocated by the state's General Assembly, meaning that we generate revenue to cover salaries, employee benefits, and operating costs through timber sales, pine straw sales, recreational permits, land leases, etc. The SCFC is required by law to give 25% of gross revenue generated on lands to the school district in which revenue was made.

Manchester State Forest (MSF) is located in Sumter and Clarendon counties, currently consisting of approximately 28,500 acres of mixed pine and hardwood species native to the midlands of South Carolina. The property was acquired by the federal government in the early 1930s as part of the Resettlement Administration, a program aimed at relocating families who lived on overworked farmland. From 1935 to 1939 the property was operated as the Poinsett Project. Shortly after obtaining this acreage, the Civilian Conservation Corps (CCC) began to restore it by planting timber, making timber

harvest sustainable. The CCC also created lakes, trails, and roads in the future state forest.

The federal government leased the land to the SCFC in 1939, changing the name to Poinsett State Forest. The forest name was changed to Manchester State Forest, in 1949, to honor the lost town of Manchester that once stood on these lands. The town thrived in the mid-nineteenth century due to its proximity to the Santee River.

In 1955 title of the land was transferred to the SCFC with the stipulation that it utilize the principles of multiple-use management while maintaining the landscape as a natural resource. Multiple-use management refers to managing the land with more than one primary objective, while preserving the long-term yield of wood and non-wood products. The primary principle of the landowner is to achieve optimum yields of products without impairing the productive capacity of the site.

Problem Statement

MSF's main source of revenue is through timber sales. MSF generates on average $600,000.00 in timber sales per year. Manchester State Forest conducts 2 to 4 intermediate timber sales per year, yet we have no standard processes for selecting a harvesting method. SCFC needs to establish a standard process for selecting timber harvests method at MSF to be more efficient, while maintaining accuracy, to maximize revenue and stand quality.

Data Collection

There are two main operational ways that MSF conducts an intermediate harvest (thinning). One way to conduct an intermediate harvest is called a marked sale. A

marked sale is conducted by forest personnel going out into a stand of timber and physically marking trees to be removed or by marking trees to be left standing with paint at eye level and on the stump at ground level. The typical payment method for this type of harvest is a lump sum payment, which means the buyer of the sale pays for the wood to be cut before harvest. The other way MSF conducts an intermediate harvest is by an operator select harvest. An operator select harvest allows the logger to choose which trees to be harvested and which trees will be left for future harvest. The typical payment method for this type of harvest is a per unit payment, which means the buyer of the sale pays for the wood along and along as they cut it. Payments and scale tickets are typically due once a week during the harvest.

I will be examining the two harvesting methods listed above for differences in cost and time to execute, residual stand quality, expectations of harvest met, timber buyers preferred methods, and market trends. The overall goal of the data collected and used for analysis is to determine the best method of intermediate timber harvest that will produce the best job, for the least amount of input/cost, while maintaining quality residual timber.

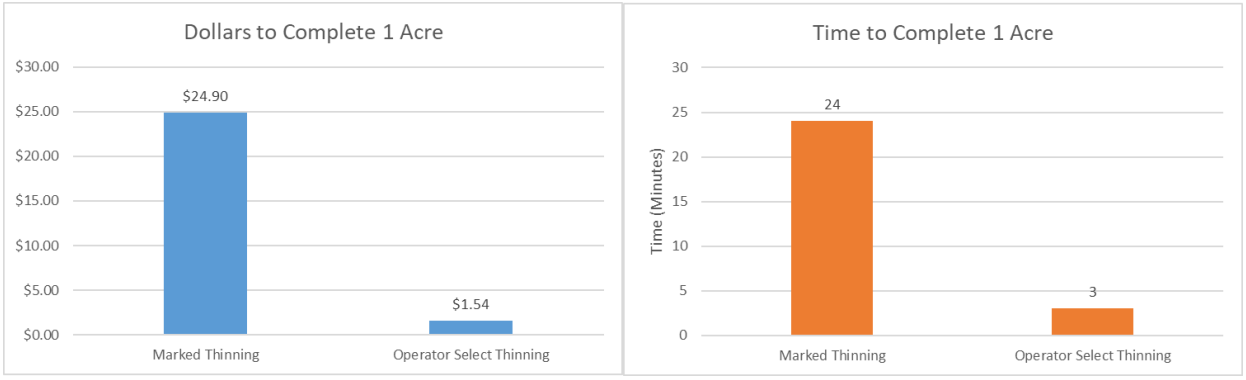
The cost per acre and time per acre to execute a sale were calculated using salary data, known time to execute, and current market pricing for supplies needed. Data used to evaluate residual stand quality and expectation of harvest were taken from historical and current timber sale cruise information and inventory cruises. The cruise and inventory data covered 27 timber sales over a 10-year period. These 27 timber sales included 133 individual stands of timber. I created a survey to poll timber buyers for their preferred method of harvest operation and payment. These surveys were

emailed to 30 buyers. I received 12 responses, giving me a 40% response rate. The last set of data examined was market trends. This information was taken from *Timber Mart-South and Forest 2 Market*. Both publications are a paid for subscription service. However, some of the *Timber Mart-South* information can be found on the SCFC website.

Data Analysis

Figure 1 shows that it costs approximately $25.00 and takes 24 minutes to complete one acre of a marked thinning. As opposed to approximately $1.50 and 3 minutes to compete the same acre of an operator select thinning. That is a $23.50 difference in cost and 21 minutes difference in time to execute a marked thinning vs an operator select thinning per acre. This means that it is 16 times cheaper and 8 times faster to complete an operator select cruise over a marked timber cruise. This shows that there is a significant savings in money and time to an operator select harvest.

Figure 1: Cost and Time to Execute 1 Acre by Harvest Method

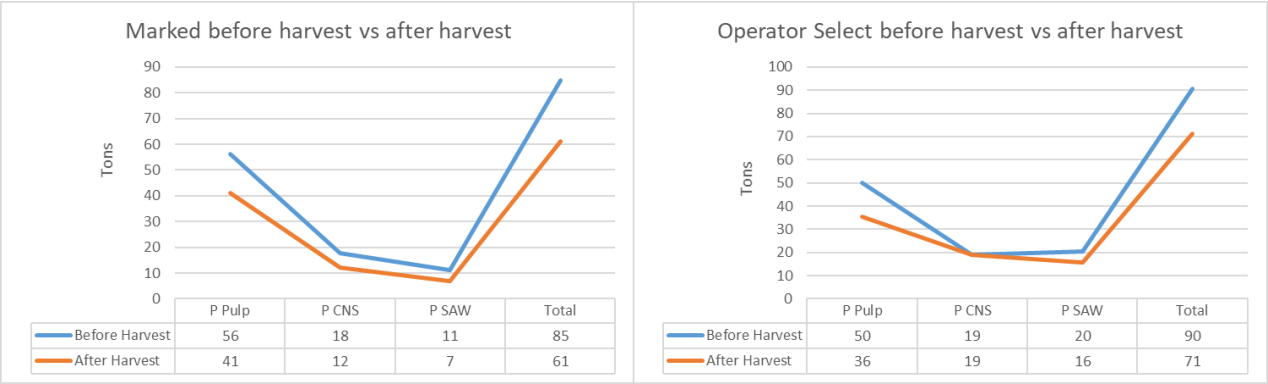


Next, I looked at the residual stand quality. This is an important factor to consider because what is left after a thinning will determine what is available for harvest the next

time your stand needs a harvest. Typically, a stand of timber gets two thinnings and a rotational harvest over a 40-year period. As timber gets older it gets taller and bigger around, this causes the timber to move to more profitable product classes. The product classes are pulpwood, chip and saw, saw timber, and specialty. Pulpwood and chips are used for products such as paper and packaging and saw timber is used for lumber. Some specialty products include poles (telephone poles) and plywood.

The takeaway from the graphs shown in Figure 2 is that there is not a significant difference in either of the comparisons between marked thinnings and operator select thinnings. This means that the volumes before and after the harvest are essentially the same. There is no substantial difference in timber removed between harvesting methods. The other takeaway is that the marked thinning is removing 24 total tons per acre and the operator select thinnings are removing 19 tons per acre. This means that the operator select thinning is removing 5 less ton per acre of total volume than the marked thinnings.

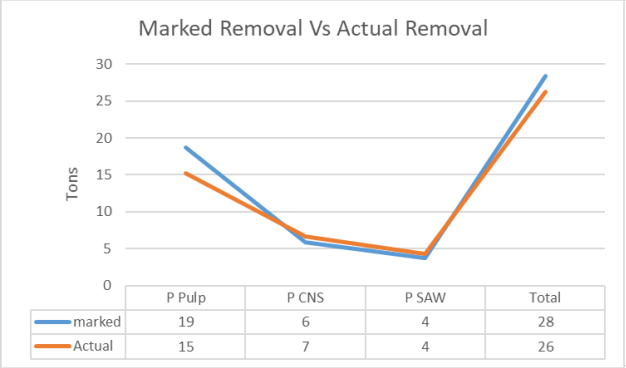
Figure 2: Comparison of Timber Volumes Before and After Harvest



Another factor that could be involved in choosing one harvest method over the other is the actual results compared to expected results. The only way to figure the true, actual, results of a harvest is to require that scale tickets be provided from the logger. These scale tickets come from the mill and reflect exactly how many tons of a product were cut and delivered to the mill. We require scale tickets when selling timber as an operator select, however we do not generally require them for a marked sale. The other way to check for accuracy of a sale is to subtract the residual stand volume from the pre-harvest stand volume and compare it to the cruised or removed volumes.

Figure 3 shows the marked thinning's have very little variance between the timber that is marked to be cut and the timber that is removed. This is exactly what it should be since loggers can only cut the trees that are marked. The graph for operator select harvest is more varied. The main reason for this variation is because, as sellers of the timber, we must make assumptions about what product class of volume is going to be cut and removed. A logger has complete control to decide which trees are harvested and which mill they deliver the products to. We monitor harvest closely, have contracts in place with certain requirements and performance bonds, and have good working relationships with timber buyers and loggers to ensure proper tonnage is removed.

Figure 3: Marked/Cruise Volumes Removed and Actual Volumes Removed



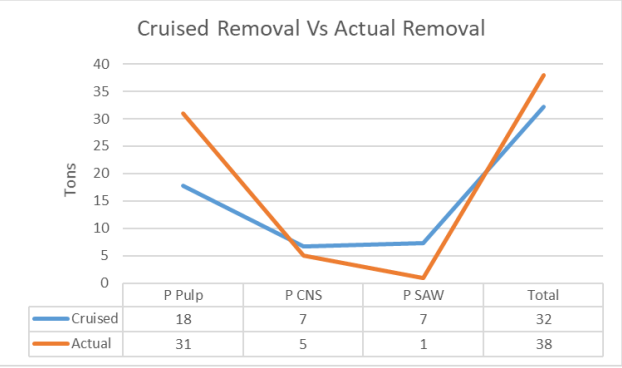
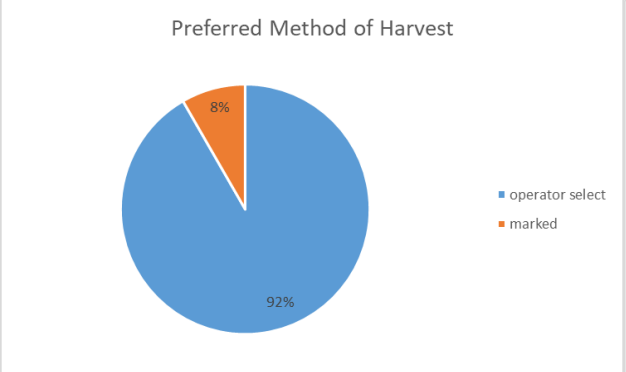
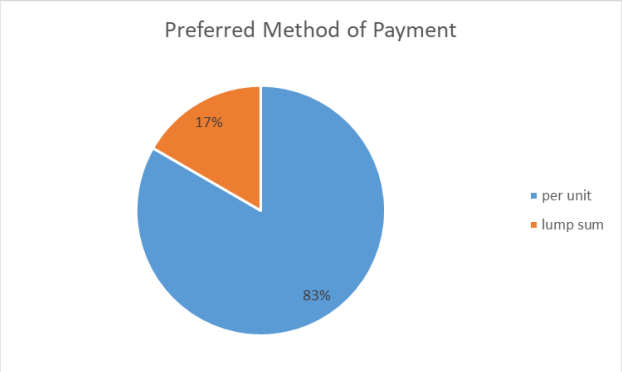


Figure 4 below shows the preferences of timber buyers when it comes to timber sales operational and payment methods. These preferences can influence the dollar amounts and number of bids received on a sale, which could cause a greater revenue to be paid to seller. The data shows that buyers prefer an operator select thinning operation. The buyer also prefers to pay along and along instead of one payment upfront. This makes sense because timber companies do not want to sit on large loans or have large amounts of money tied up in holdings. Timber buyers noticeably prefer an operator select harvest method and a per unit payment method.

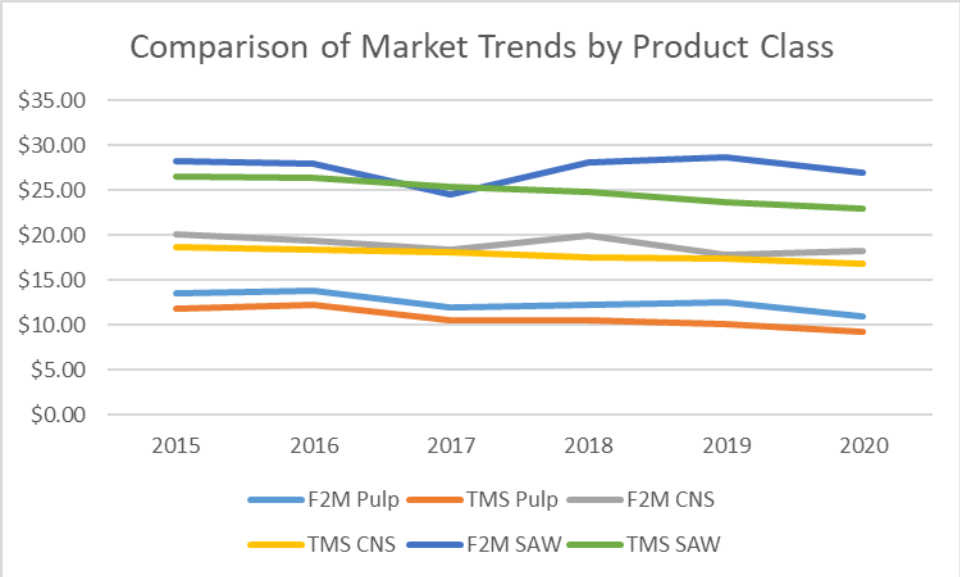
Figure 4: Timber Buyer Preferences





Data was collected on market trends from 2015-2020 from two of the industry standards, Timber Mart-South and Forest 2 Market. Timber Mart-South provides quarterly market trends, whereas Forest 2 Market provides bi-monthly market trends. The dollar amounts below were averaged to come up with a yearly comparison. There is not a significant difference in the two standards. See figure 5 below for comparison of market trends. The only difference seen in the graph below is that Forest 2 Market numbers are slightly higher across the board.

Figure 5: Market Trends for Timber Prices



Implementation Plan

According to the above data, Manchester State Forest should be using an operator select method to thin the majority of stands that come up for intermediate harvest. Marked thinnings should be reserved for special circumstances that require precision in timber removal. Special circumstances will include areas to be harvested

around insect and disease issues, endangered species, and any specific habitat or residual stand concerns.

The assistant forest director at Manchester State Forest oversees the timber harvesting, with oversite from the director. Our timber harvest stands are set each year by a timber growth modeling system that optimizes harvest based on certain constraints and parameters. The harvesting schedule for the next year is usually reviewed in July. The assistant director will be instructed use the operator select thinning method, unless the director overrides the harvest method based on special circumstances.

Evaluation Method

In order to evaluate our plan, we will continue to collect pre- and post-harvest volume data. We will compare this data after every harvest to build patterns and trends. We will also continue to collect inventory data on a 5-year cycle to compare stand growths. Data will be entered into excel spreadsheets, where analysis can be done and numbers can be compared.

Summary and Recommendations

There were 2 major takeaways from the data collected and analyzed. The first is that an operator select thinning is less expensive and less time consuming to execute than a marked thinning. The other factor that stood out is that the volumes harvested from an operator select thinning is not as easily predicted as a marked thinning.

Therefore, I would suggest that an operator select thinning be utilized more often than a marked thinning because of benefits to save on time and money while maintaining

residual stand, unless special circumstances exist that require a very accurate and precise harvest.

References:

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- History, https://www.scpictureproject.org/sumter-county/manchester-state-forest.html
- History, https://www.scencyclopedia.org/sce/entries/manchester-state-forest/#:~:text=From%201935%20to%201939%20the,Manchester%20State%20Forest%20in%201949.
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- Data for Timber Mart-South, http://www.trees.sc.gov/mprice.htm